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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/017,033	12/14/2001	Hichem M'Saad	A6139/T43800	7470
32588	7590	12/23/2004	EXAMINER	
APPLIED MATERIALS, INC. 2881 SCOTT BLVD. M/S 2061 SANTA CLARA, CA 95050			HOFFMANN, JOHN M	
			ART UNIT	PAPER NUMBER
			1731	

DATE MAILED: 12/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/017,033

Applicant(s)

M'SAAD, HICHEM

Examiner

John Hoffmann

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 September 2004 and 24 November 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 and 20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 and 20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                                                                   |                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                              | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 27 September 2004 has been entered.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

~~Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhong 6705124 in view of Shieh 6204200~~

**1. (Currently Amended) A method for forming an optical waveguide on a substrate in a process chamber, the method comprising:**

Zhong does not appear to disclose the use of a chamber. It would have been obvious to use a chamber so as to maintain the environment, prevent gases from escaping, and prevent contaminants from being incorporated in the product. Examiner gives official notice that process chambers are well known.

**depositing an undercladding layer over the substrate;**

**forming a plurality of separated optical cores over the undercladding layer,**

These two steps are disclosed at claim 9 of Zhong, as well as the figures.

**the plurality of optical cores defining a sequence of gaps having a width between 1 and 2  $\mu\text{m}$**

The sequence of gaps is disclosed in various portions, for example see col. 2, line 11-26, and figure 1 of Zhong. The gap width is taught at col.5, line36 – among other places.

**and an aspect ratio between 2: 1 and 7:1;**

See Zhong, col. 5, line 37.

**and depositing an uppercladding layer over the plurality of cores and within the gaps with a high-density plasma process that includes simultaneous deposition and sputtering components**

See, Zhong, figure 6, col 5, lines 53-57, and col 6, lines 3-5 and elsewhere.

**and having a deposition-sputter ratio between 3:1 and 10:1 to fill the gaps, wherein the deposition-sputter ratio is defined as the ratio of a sum of a net deposition rate and a blanket sputtering rate to the blanket sputtering rate for the high-density plasma process.**

Zhong does not disclose the ratio. Although it has to be greater than 1:1 – otherwise nothing would get deposited. Shieh is cited because it shows that it is known that the claimed deposition-sputter ratio is a result effective variable when using HDP silica deposition and discloses a values that are consistent with applicant: see claim 8 of Shieh as well as col. 3, lines 1-57 and figure 6. On the basis of what is known to those in the high density plasma deposition art: it would have been obvious to have the claimed deposition-sputter ratio so as to be able to fill any gap between adjacent cores. Alternatively, it would have been obvious to perform routine experimentation to determine the optimal deposition-sputter ratio.

Claims 1 – 7, 13-15, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bazylenko 6154582, in view of Dragone 5136671, Shieh 6204200 and optionally in view of Zhong and Van Cleemput 5872058 or Roche 5913140,

The basic method is disclosed in Bazylenko at the paragraph spanning cols. 6-7, figure 1A and col. 2, line 56. However, the plurality of cores, the aspect ratio, the gap width and the deposition-sputter ratio is not taught. It is noted that it would have been obvious to put multiple cores on the substrate so as to have more pathways for light communication. Duplication of parts is rarely a patentable invention and Applicant has not indicated any evidence of non-obviousness. Furthermore multiple cores is conventional: see Dragone.

Moreover, Dragone discloses (col. 1, lines 42- 52) that the waveguides must be closely spaced, but that such causes crosstalk. It would have been obvious to perform routine experimentation to determine the optimal spacing between the waveguides to balance these two conflicting effects. As can be seen in Dragone, the cores are shown to get closer and closer – until they meet – it would be reasonable to expect that at some location before they meet, that the gap is 1-2 microns wide.

As an alternative combination: it would have been obvious to make the Dragone device by using the Bazylenko method for the advantages that Bazylenko discloses for example in col. 3.

Shieh is cited because it shows that it is known that the claimed deposition-sputter ratio is a result effective variable when using HDP silica deposition and

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discloses a values that are consistent with applicant: see claim 8 of Shieh as well as col. 3, lines 1-57 and figure 6.

Van Cleemput and Roche are optionally cited as showing that applicant's gap-fill problem and solutions are well known.

On the basis of what is known to those in the high density plasma deposition art: it would have been obvious to have the claimed deposition-sputter ratio so as to be able to fill any gap between adjacent cores. Alternatively, it would have been obvious to perform routine experimentation to determine the optimal deposition-sputter ratio.

As to the aspect ratio: it is clear that if one were to use the Bazylenko 4.5 micron cores with a 1-2 micron gap, that one would have an aspect ratio of 2.25:1 – 4.5:1. Van Cleemput, Zhong and Roche show that such aspect ratios are known to be filled with HDP.

Claim 2: see col. 2, lines 32-36 of Bazylenko.

Claim 3: col. 6, lines 22-25 of Bazylenko.

Claim 18: see col. 6, line 19 of Bazylenko.

Claim 4: The flow rates are not disclosed. It would have been obvious to have whatever flow rates in as desired – depending upon the scale of the operation/chamber. Clearly a small substrate would require a lower flow rate than a large substrate. Furthermore, it would have been obvious to perform routine experimentation to determine the optimal flow rates.

Claim 5: see col. 7, line 4 of Bazylenko.

Claim 6, Examiner gives Official notice that it is conventional to use inert gas in HDP process for any number of reasons: to flush, to act as a carrier gas, etc. It would have been obvious to use an inert gas for any of the well known reasons, with no new or unexpected results.

Claim 7: see col. 2, lines 34-35, and col. 6, lines 63-67 of Bazylenko : any amount would be obvious based on the scale of the operation, and the degree of doping desired.

Claim 13: based on col. 5, line 49 and col. 6, line 12 of Bazylenko, the power density appears to be only 4 W/cm<sup>2</sup>. It would have been obvious to perform routine experimentation to determine the optimal power, with no new or unexpected results. Furthermore, even if one was felt that they were limited to the disclosed power for the figure 1a of Bazylenko embodiment, such gives no indication as to what the power would be for the ECR (col. 6, line 19) alternative embodiment. It would have been obvious to perform routine experimentation to determine the optimal power for the ECR embodiment.

Claim 14: there is a bias applied: col. 6, lines 13-14. It would have been obvious to perform routine experimentation to determine the optimal bias power.

Claim 15: Bazylenko uses a pressure of 15 millitorr. It would have been obvious to perform routine experimentation to determine the optimal pressure in the ECR apparatus.

Claim 20: col. 6, lines 64-65 of Bazylenko discloses an index of 1.45 which is between 1.46 and 1.4473. 1.46 is "about 1.4443". There is no indication that the 1.45



value is at 1550 nm. If the claim limitations aren't inherently met, it would have been obvious to have what ever index one desires, depending upon the particular optical device/characteristics one desires.

Claim 8 rejected under 35 U.S.C. 103(a) as being unpatentable over Bazylenko 6154582, in view of Dragone 5136671, Shieh 6204200 and optionally in view of Zhong and Van Cleemput 5872058 or Roche 5913140 as applied to claim 7 and further in view of Ngai 6451686.

In the HDP deposition art, SiF<sub>4</sub> and CF<sub>4</sub> are known equivalents for fluorine sources see col 13, lines 46-54 and col. 12, lines 33-37 (Ngai). IT would have been obvious to substitute equivalents in the Bazylenko method, depending upon which gases are most available.

Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bazylenko 6154582, in view of Dragone 5136671, Shieh 6204200 and optionally in view of Zhong and Van Cleemput 5872058 or Roche 5913140 as applied to claim 2 above, and further in view of Imoto 4856859.

Bazylenko dose not disclose using phosphorous gas as claimed. Imoto discloses that one can dope cladding using the claimed gas: col. 4, lines 61-66 and col. 2, lines 20-28. It would have been obvious to include the claim gas depending upon what specific glass is desired and what particular properties one desires for the final

product. The particular flow rates would have been obvious depending upon the desired degree of doping, and the size of the substrate to be made.

For claim 11 – it would be obvious to include boron as claimed – if one desires the known properties that boron produces in the final product.

Zhong is cited as being an “optional” because it is not necessary to demonstrate the invention is obvious (in the event that Applicant swears behind the Zhong filing date.) However Zhong does show that it is known to use HPD to make conformal layers with glass that includes boron and phosphorous.

Claims 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bazylenko 6154582, in view of Dragone 5136671, Shieh 6204200 and optionally in view of Zhong and Van Cleemput 5872058 or Roche and Imoto 4856859 as applied to claim 11 above, and further in view of Schneider 4557561.

The boron trifluoride is not taught. Col. 3, lines 29-40 of Schneider discloses using the boron trifluoride when making a glass: to 1) add fluoride, and 2) to add the boron as a dopant. It would have been obvious to use boron Trifluoride in the Bazylenko process so as to supply another dopant Boron, and to help incorporate fluorine into the glass – depending upon the desired optical/chemical properties the artisan wishes to have in the final product.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bazylenko 6154582, in view of Dragone 5136671, Shieh 6204200 and optionally in view of Zhong and Van Cleemput 5872058 or Roche 5913140 as applied to claim 1 above, and further in view of Rossman 6194038

Bazylenko discloses different operating parameters than is being claimed. However, Rossman recognizes that the same claimed operating parameters "greatly increases the deposition rate" (col. 2, lines 29-34) – among other advantages. See col. 3, lines 8-37 of Rossman which discloses the various parameters. Col. 2 lines 9-21 discloses that the process is of the same nature as applicants' and Bazylenko's. It would have been obvious to change the Bazlenko parameters/gases to be in line with the Rossman parameters/gases for any or all of the Rossman advantages.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bazylenko 6154582, in view of Dragone 5136671, Shieh 6204200 and optionally in view of Zhong and Van Cleemput 5872058 or Roche 5913140 as applied to claim 1 above, and further in view of Rossman 6194038 and Narita 6122934

For claim 17: Narita discloses the same problem that Applicant and Rossman notes: a gap between two close structures. Bazylenko does not disclose this problem. It would have been obvious to have as many cores/waveguides on the substrate as possible, so as to have a high a circuit density as possible. It would have been obvious to use the Rossman method of etching between gaps so as to create conformal layers,

and for the high deposition rate. It would have been further obvious to add an additional layer so as to protect the optical device as disclosed in the Narita Abstract.

Zhong is cited as being an "optional" because it is not necessary to demonstrate the invention is obvious (in the event that Applicant swears behind the Zhong filing date.) However Zhong does show that it is known to use HPD to make conformal layers with glass that includes boron and phosphorous.

### ***Response to Arguments***

Applicant's arguments filed 24 November 2004 have been fully considered but they are not persuasive.

It is argued that Bazylenko does not disclose multiple pathways. This is not very relevant because 1) various secondary references disclose that it is known 2) it is prima facie obvious to duplicate parts for duplicate effects. It is not invention to have multiple waveguides.

It is also argued that it doesn't seem to be reasonable to have multiple waveguides with Bazylenko's electro-optical transducer. Col. 3, lines 9-10 of Balzlenko discloses that the HDP process "has advantageous application for the fabrication of any optical device." It is largely irrelevant that one might not want more

than one waveguide on a specific device. Once would clearly not be limited to that one device.

It is further argued that Balzylenko does not disclose using deposition/sputter process for the cladding layer. As applicant points out, Balzylenko teaches using PECVD, this is sufficient in that this encompasses at least all PECVD methods that Balzylenko discloses. This includes the deposition/sputter process.

### ***Conclusion***

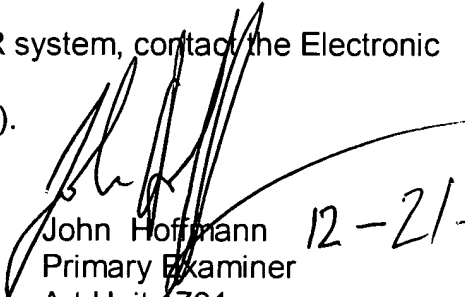
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Soole and Dragone 5002350 are cited as disclosing features of applicant's invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Hoffmann whose telephone number is (571) 272 1191. The examiner can normally be reached on Monday through Friday, 7:00- 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steve Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



John Hoffmann  
Primary Examiner  
Art Unit 1731

12-21-04

jmh